

Implementing Total Quality Management on Construction Sites

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Abstract

Quality systems entail having the organizational structure, responsibilities, procedures, processes and resources for implementing quality management such that there is a guiding framework to ensure that every time a process is performed the same information, method, skills and controls are used and practiced in a consistent manner. Total Quality Management (TQM) has been defined as a comprehensive systematic, integrated, consistent, organization-wide effort dedicated to customer satisfaction through continuous improvement. With its primary focus being the involvement of everyone, TQM has the potential to improve business results, greater customer orientation and satisfaction, worker involvement and fulfilment, teamworking and better management of workers within companies. Its ability to adapt to new ideas, tools and methods suggest that it can be applied albeit in an altered form to construction field operations involving workers at levels traditionally regarded as below middle management. However, the construction industry has been slow to embrace the concept of TQM. Construction firms have been continually struggling with its implementation. Historically construction has been an industry reluctant to implement change. Consequently it has remained behind where it should be on the implementation of TQM. Generally the principles of TQM are not applied beyond management levels within general contractors. There are few contractors that have fully implemented TQM at every level within their field organization, and even fewer at the field level of their subcontractors and suppliers. This paper reports on a study conducted in the United States to identify those factors that hinder the implementation of TQM principles in the actual field operations of a construction jobsite. These inhibitive factors were identified through a literature review and a survey of a sample of contractors.

Keywords

TQM; customer satisfaction; management commitment; paperwork; worker participation

1. Introduction

A cultural and behavioural shift in the mind-set of all participants in the construction process (Love and Heng, 2000; Kanji and Wong, 1998) especially top or senior management is necessary if the construction industry is to improve its performance and competitiveness. For innovation and continuous improvement to be encouraged and become a norm traditional practices need to be unlearned. Historically the construction industry has been reluctant to implement change. This process of change is especially difficult in the competitive environment in which construction takes place and where the bottom line is still the primary motivation of construction companies. Further, companies are prepared to only implement those aspects of Total Quality Management (TQM) programs that will provide them with competitive advantage and improve their overall financial performance. Ironically, research conducted by others such as Zantanidis and Tsiotras (1998) identified quality as being the most significant provider of competitive advantage. Construction companies clearly have not bought into this finding in their daily operations on site.

The authors conducted a study in the United States to identify those factors that hinder the implementation of TQM principles in the actual field operations of a construction jobsite. These inhibitive factors were identified through a literature review and a survey of a sample of contractors. This paper reports on these findings.

Participants in the study were asked to respond to several questions relating to the importance of certain criteria to the successful implementation of TQM in their companies. While only selected responses are discussed, the complete ranking of responses is shown in Table 1.

2. Management Commitment and Involvement

Almost all of the 109 valid¹ responses to the questionnaire survey regarded as important the commitment and involvement of their top or senior management in the TQM process for its successful implementation.

This finding accords with those of several other studies (Reed et al., 2000; Kathuria and Davis, 1999; Miller, 1996; Anderson et al., 1994; Tata and Prasad, 1998; Douglas and Judge, 2001; Saraph et al., 1989; Rahman, 2001). Management leadership is regarded as one of the categories needed for adoption as determined by the Malcom Baldrige National Quality Award in the United States. The pivotal role of top management for quality improvement programs is embodied in the working definition of Whiteman (2002) of TQM for construction firms which states,

“TQM is a continuous process whereby the top management of construction firms take whatever steps are necessary to enable everyone in the organization, especially construction field supervisors and construction workers in the course of executing all their activities on construction sites to establish and achieve standards, which include completion on time, within budget, to optimum quality

¹ SPSS labels those respondents “valid” that are included in the analysis after adjustment for non-responses.

standards, and without loss of life or limb, and exceed the needs and expectations of their clients, both internal and external.”

Several studies have shown that the lack of upper or top management involvement or commitment to TQM is a stumbling block to its successful implementation (Schriener et al., 1995; Glover, 2000).

Table 1 - Ranking of responses of all respondents to TQM criteria

Rank Full Sample	Criteria	Mean²	Std. Dev.	CV(%)³
1	Top management commitment	3.98	1.20	30.2%
2	Top management involvement	3.78	1.29	34.1%
3	Primary customer focus	3.76	1.07	28.5%
4	Well developed planning	3.40	1.29	37.9%
5	Participative management style	3.22	1.28	39.8%
6	Continuous improvement measurements	3.04	1.33	43.8%
7	Rewards for TQM contributions	2.99	1.45	48.5%
8	TQM applied to all field operations	2.85	1.41	49.5%
9	Workers trained in TQM	2.71	1.35	49.8%

3. Customer Focus

All respondents regarded primary customer focus as the next most important requirement for successful TQM implementation. Several authors by definition consider customer focus as equally important as upper management involvement and commitment to TQM principles (Kelemen, 2000; BS 4778, 1991; Anfuso, 1994; AGC, 1992). In many studies, the issue of customer satisfaction or focus featured prominently as a defining concept or critical element of TQM implementation (Anderson et al., 1994; Shammas-Toma et al., 1998; Tata and Prasad, 1998; Douglas and Judge, 2001; Black and Porter, 1996; Rahman, 2001).

4. Participative Management Style

Participative management was an important criteria to the respondents in the implementation of TQM. This finding is well-supported in the literature (Kathuria and Davis, 1999; Young and Wilkinson, 2001; Ho et al., 2000; Stashevsky and Elizur, 2000). The importance of participative management is suggested by the notions of relationship oriented practices (Kathuria and Davis, 1999), employee fulfilment (Anderson et al., 1994), teamwork (Shammas-Toma et al., 1998; Black and Porter, 1996), employee involvement, empowerment and teamwork (Tata and Prasad, 1998; Kols and Sherman, 1998), employee relations (Saraph et al., 1989), people (Rahman, 2001; Yusof and Aspinwall, 2000), and human resource development (MBNQA). The

² On the scale used, 1= totally disagree, 2= generally disagree, 3= somewhat agree, 4= generally agree, 5= totally agree.

³ Coefficient of Variation (CV%) is a quantity designed to give a relative measure of variability. The CV expresses the standard deviation as a percent of the mean.

lack of integration between TQM and human resource practices has been cited as a major barrier to achieving full-blown TQM (Glover, 2000).

5. Transfer of TQM from the Home Office to Field Operations

Most of the respondents had made efforts to implement the principles of TQM within their management operations. Relatively few of these firms (34%) had been successful in transferring this effort to their field operations. Unless TQM can be effectively implemented into field operations on site its benefits to the construction industry at large will be minimal. Since profits and losses are generated by construction activities on sites, improvement efforts have to be targeted at this essential area. In construction most of the workers of companies are employed on construction sites. Several authors maintain that workers need to be empowered and involved in TQM principles. They have argued for a shift in power from management to field operations (Richbell and Rasiatou, 1999); increased involvement of workers and increased contextual application of TQM principles (Glover, 2000); increased training of supervisors and hourly paid workers (Kassicieh and Yourstone, 1998; Chandler, 2000); and increased training in problem-solving and statistical process control (Marler, 1998).

Several key elements as shown in Table 2 were found to be major hindrances to the transfer of TQM to the field operations of construction companies.

Table 2 - Ranking of responses to TQM problem areas

Rank	Criteria	Mean ⁴	Std. Dev.	CV (%)
1	Too much paperwork	3.44	1.26	36.6%
2	Subcontractors and suppliers not interested	3.39	1.24	36.6%
3	Low bid subcontracting	3.39	1.29	38.1%
4	Difficulty in measuring results	3.35	1.33	39.7%
5	Field employees regard TQM as irrelevant	3.31	1.20	36.3%
6	Transient work force	3.28	1.21	36.9%
7	Low education level of field forces	3.13	1.28	40.9%
8	Focus on short term cost savings	3.05	1.29	42.3%
9	Too tight scheduling	3.02	1.36	45.0%
10	No operations to benchmark	2.90	1.37	47.2%
11	TQM just a buzz word	2.83	1.39	49.1%
12	Too many uncontrollable factors	2.81	1.33	47.3%
13	Unique nature of construction	2.81	1.31	46.6%

The first six of these problem areas are briefly discussed in the next section.

6. Too Much Paperwork

⁴ On the scale used, 1= totally disagree, 2= generally disagree, 3= somewhat agree, 4= generally agree, 5= totally agree.

Most of the respondents (77%) regarded the generation of too much paperwork through implementation of TQM principles as the most inhibiting issue to its success in the field. Most construction projects already involve large amounts of paperwork. These include voluminous contract documents, records of plans and amendments, architects' instructions, steel bending schedules, change orders, forms to record the requisition, order, delivery and movement of material, plant and labour, and material safety data sheets. Several authors support this view. Harari (1993a and 1993b) was concerned about the creation of cumbersome bureaucracies due to increases in paperwork to track the benefits of TQM programs. Lilrank et al. (2001) argue that excessive paperwork is prohibitive.

7. Transient Nature of Workforce

Similarly, most of the respondents (74%) stated that the transient nature of the workforce was restrictive to the implementation of TQM on construction sites. By its nature construction to a certain degree necessitates a transient workforce. Each project is built on a new construction site. Usually that site is not close to where workers had previously worked. Consequently workers will seek employment closer to home or have to relocate where this is not possible. Crosby (1990) suggests that companies need to work as hard on employee relationships as they do on their customer interfaces.

8. Field Employees Regard TQM as Irrelevant

A large proportion of respondents (79% of the sample) indicated that workers on construction regarded TQM as irrelevant to their performance. Schriener et al. (1995) suggested that obsession with the bottom line and seeing quality as merely an overhead might be contributory to this attitude. Further the exclusion of employees from quality improvement efforts and especially decision making relative to this improvement is a serious problem (Richbell and Rasiatou, 1999; Chandler, 2000; Senge et al., 1994). Other exacerbating factors include lack of proper training and continuous skills development (Katz, 1995; Wruck and Jensen, 1998; Reed et al., 2000), difficulty in generalizing training to opportunities to apply what has been taught (Marler, 1998), motivation of workers to want to improve their work (Hackman and Wageman, 1995; Katzenbach, 2000), and effective communication and project coordination (Shammas-Toma et al., 1998). Both construction managers and workers require a paradigm shift to a team approach (Shammas-Toma et al., 1998; Allan and Kilmann, 2001; Reed et al., 2000).

9. Difficulty in Measuring Results

Most of the respondents (75%) noted the difficulty in measuring results on construction sites as problematic for TQM implementation on those sites. Schriener et al. (1995) have suggested the lack of meaningful measurements as a major stumbling block. Whalen and Rahim (1994) and most TQM patriarchs from Deming to Juran echo these views. The assessment of quality is cited in the Malcolm Baldrige Award as being a critical feature of TQM (George and Weimerskirch, 1998). Wruck and Jensen

(1998) suggested several performance measurement systems that could be used such as construction cycle time, late delivery rates, and order lead times.

10. Low Bid Subcontracting

Similarly, most of the firms (74%) reported that low bid subcontracting presented a serious challenge to the successful implementation of TQM on construction sites. Low bid strategies have been the basis for awarding the majority of construction projects, especially subcontracts. This occurs despite the general contract being awarded on a different basis. Deming specifically advises that the practice of awarding business on price tag alone should be ended (Yong and Wilkinson, 2001). Schriener et al. (1995) also refer to this issue when they describe the obsession of companies with the bottom line as a stumbling block to TQM. Shamma-Toma et al. (1998) support this view. Glover (2000) refers to this tendency as business short-termism. According to Lahndt (1999), the construction industry's inherent competitive bid process and competitive environment has led to an emphasis on quick work and short time horizons, and a lack of long term viability and quality.

11. Subcontractors and Suppliers Not Interested in TQM

This issue was identified by the majority of respondents (65%) - only slightly below that of low bid subcontracting. For a TQM program to be successful, it has to be all-inclusive and comprehensive. In the overall sample, 26 of the 109 of respondents indicated that they utilized TQM principles in their operations. They did not have any formal TQM plans in place confirming the tendency of firms to only use selected parts of TQM programs. Wruck and Jensen (1998) and Douglas and Judge (2001) argue that the implementation of only selected parts of TQM programs threatens its successful implementation. Reed et al. (2000) contend that cross-functional communication that in the case of construction must include subcontractors and suppliers is necessary to solve quality problems. Shamma-Toma et al. (1998) suggest that effective teamwork is essential. To this end they argue that all parties must be bound together by mutually set and internalised goals rather than by contractual arrangements alone. The development of quality teams on the job site will lead to better support and quicker response to all members of the supply chain. By being part of quality teams subcontractors and suppliers will be more responsive to the needs of the general contractor, becoming more cooperative and displaying a better performance record (Wong and Fung, 1999). Subcontractors should be treated as partners (Kanji and Wong, 1998). As such they must be provided with all the information and support to enable them to carry out their work. A participatory approach involving all parties is advocated by the CIOB (1995) based on evidence in the Japanese construction industry. Ulrich et al. (1999) maintain that the value of the whole should be more than the sum of its parts. Kale and Arditi, (2001) point out that the General Contractor to be successful must consider the subcontractors and suppliers on the project as a strategic asset critical to the project, and the ultimate perceived performance of the General Contractor by the customer.

12. Conclusion

It is apparent that if TQM is to be implemented successfully on construction sites the inhibitive issues that have been identified from the literature and the contractor survey need to be addressed on a comprehensive and integrative basis. The principles of TQM should be applied beyond management levels and include workers on construction sites. These workers must be empowered, involved and trained in problem solving. Companies need to work on improving worker relationships in the same way that they do for their external customers. Through effective communication and improved project coordination workers must be motivated to improve their work. Contractors must move away from their obsession with the bottom line. They need to bind all parties together including subcontractors by mutually set and internalised goals. However, any attempt to bring about meaningful change with respect to implementing TQM on construction sites will only succeed if top or senior management commit and involve themselves in the TQM process.

13. References

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